

A review of *Acacia coolgardiensis* (Leguminosae: Mimosoideae) and closely related species in Western Australia

Bruce R. Maslin¹ and Carrie Buscumb

Western Australian Herbarium, Department of Environment and Conservation,
Locked Bag 104, Bentley Delivery Centre, Western Australia 6983

¹Corresponding author

Abstract

Maslin, B.R. & Buscumb, C. A review of *Acacia coolgardiensis* (Leguminosae: Mimosoideae) and closely related species in Western Australia. *Nuytsia* 18:107–125 (2008). The three subspecies formerly comprising the widespread, variable, Western Australian species *Acacia coolgardiensis* Maiden are now treated as distinct species, namely, *A. coolgardiensis*, *A. effusifolia* Maslin & Buscumb (syn. *A. coolgardiensis* subsp. *effusa* R.S.Cowan & Maslin) and *A. latior* (R.S.Cowan & Maslin) Maslin & Buscumb (syn. *A. coolgardiensis* subsp. *latior* R.S.Cowan & Maslin). Two new related species are also described, *A. incognita* Maslin & Buscumb which was formerly confounded with *A. coolgardiensis* subsp. *coolgardiensis*, and the recently discovered *A. sulcatacaulis* Maslin & Buscumb which is listed as a Priority One species according to the Department of Environment and Conservation's (DEC) Conservation Codes for Western Australian Flora. A key to the recognition of these five species is presented.

Introduction

Acacia coolgardiensis Maiden was defined by Cowan and Maslin (1995) as a wide-ranging, variable species comprising three subspecies, subsp. *coolgardiensis*, subsp. *effusa* R.S.Cowan & Maslin and subsp. *latior* R.S.Cowan & Maslin. It was recognised at the time that this was a conservative classification and that future study may necessitate the species being further divided or the subspecies being treated as distinct species.

The impetus that led to the present study of *A. coolgardiensis* was the need to assess the taxonomic and conservation status of three clearly allied entities which occur on or near mining leases on Karara and Warriedar Stations, about 100 km east of Morawa. In order to properly understand these entities it was necessary to examine *A. coolgardiensis* over its geographic and morphological ranges, therefore the opportunity has been taken to briefly review the entire species complex. Two of the entities referred to above are described below as the new species, *A. incognita* Maslin & Buscumb and *A. sulcatacaulis* Maslin & Buscumb, while the third is regarded as a narrow-phyllode morph of what was formerly called *A. coolgardiensis* subsp. *latior*. As to the previously-defined *A. coolgardiensis* (which is referred to below as *A. coolgardiensis sens. lat.*) it is now considered more appropriate that the three subspecies be treated as distinct species, *A. coolgardiensis*, *A. effusifolia* Maslin & Buscumb (syn. *A. coolgardiensis* subsp. *effusa* R.S. Cowan & Maslin and *A. latior* (R.S.Cowan & Maslin) Maslin & Buscumb (syn. *A. coolgardiensis* subsp. *latior*).

As discussed below *A. incognita* and *A. sulcaticaulis* share a number of important taxonomic characters with *A. coolgardiensis sens. lat.*, especially their phyllode nervature, head shape, calyx division and carpological features. However, to have included them as subspecies within an already broadly circumscribed *A. coolgardiensis sens. lat.* would have expanded the definition of the species to the extent that its concept would become somewhat meaningless. The decision to treat *A. incognita* and *A. sulcaticaulis* as distinct species led naturally to a reconsideration of the rank applied to the three subspecies comprising *A. coolgardiensis sens. lat.*

When Cowan & Maslin (1995: 19) recognised these taxa as subspecies they noted that this was a conservative classification and that the criteria used for applying rank was determined subjectively. Admittedly, our decision here to treat these taxa as species is also a subjective one but the taxa do represent robust biological entities and each exhibits geographic integrity. This action was an attempt to establish comparability of rank between taxa of the '*A. coolgardiensis* group'. Much of the significant variation found among members of this group is in the vegetative system, especially phyllode shape and size, new shoot indumentum and resinosity, and branchlet resinosity, but there are also differences in the inflorescences (especially head shape and peduncle length), pods and seeds (especially length). While most specimens can confidently be assigned to a species on the basis of morphological criteria there are a few that cannot be placed with certainty. This does not negate our decision to recognise distinct species but seems more likely to reflect the inherent variable nature of the taxa and our lack of opportunity to thoroughly elucidate this variation, including the investigation of putative hybridity. However, it is anticipated that, by emphasising the differences between the taxa by treating them as species, additional characters will be revealed in time that will further support their recognition. Treating them as subspecies focuses on the similarities between the taxa, thus reducing the impetus to look for further distinguishing features. Future study of these species may well benefit from the use of genetic markers and a more thorough study of populations in the field than we have been able to do.

The five species included in this paper are here referred to the informal '*A. coolgardiensis* group' and a key to their recognition is given below. The more important morphological characters that define this group include the following: fluted stems (*A. incognita* excepted), multi-nerved phyllodes, flowers aggregated into obloid (rarely globular) heads to short-cylindrical spikes on short peduncles, free or variably united sepals, terete, narrow, relatively thin-textured, obscurely longitudinally nerved pods, and longitudinally orientated, obloid, white-arillate seeds. Species related to those of the '*A. coolgardiensis* group' include *A. thoma* Maslin, *A. balsamea* R.S.Cowan & Maslin, *A. cockertoniana* Maslin and *A. resinosa* Maslin; the Mulga group (*A. aneura* F.Muell. ex Benth. and relatives) is not far removed.

Images of all species described in this paper are on the WorldWideWattle website (<http://www.worldwidewattle.com>) and their distributions are shown on the FloraBase website (<http://florabase.dec.wa.gov.au/>).

Taxonomy

Key to species of the '*Acacia coolgardiensis* group'

- | | |
|--|---|
| 1. Phyllodes terete, rarely subterete..... | 2 |
| 1: Phyllodes flat | 3 |

2. Peduncles stout and normally 0.5–2 mm long and obscured by the stamens at anthesis (so heads appear sessile). Heads mostly obloid to short-cylindrical and paired within phyllode axil. Ribs at extremities of branchlets often with thick overburden of resin. Stems longitudinally fluted (flutings sometimes obscure). Bark smooth (ignore extreme base of stems) **A. coolgardiensis**
2. Peduncles slender and normally 4–6 mm long and clearly visible when the heads are at anthesis. Heads mostly globular to short-obloid and single within phyllode axil. Ribs at extremities of branchlets without thick overburden of resin. Stems not longitudinally fluted. Bark fissured **A. incognita**
3. Phyllodes some or all 5 mm wide or wider **4**
3. Phyllodes all less than 5 mm wide **5**
4. Phyllodes bright green, glabrous or very indistinctly hairy. Branchlet apices clearly flattened. Pods less than 2 mm wide **A. sulcaticaulis**
4. Phyllodes silvery grey-green due to a dense indumentum (especially evident on young and adolescent phyllodes). Branchlet apices not clearly flattened. Pods 2–3 mm wide **A. latior**
5. Heads mostly single within axil of phyllodes, globular to short-obloid. Peduncles ± glabrous, visible below anthers at anthesis. Phyllodes 1–1.5 mm wide, green. New shoots and phyllodes glabrous or sub-glabrous. Branchlets not resin-ribbed. Stems (mature plants) not longitudinally fluted. **A. incognita**
5. Heads mostly paired within axil of phyllodes, short-obloid to cylindrical. Peduncles moderately to densely hairy (indumentum sometimes obscured by resin), sometimes obscured by anthers at anthesis. Phyllodes 1–4 mm wide, silvery green or grey-green to sub-glaucous. Stems (mature plants) ?always sparingly longitudinally fluted **6**
6. New shoots conspicuously hairy. Phyllodes with a distinct silvery sheen due to indumentum which covers the lamina of young and adolescent phyllodes. Branchlet ribs not resinous **A. latior**
6. New shoots not conspicuously hairy, encrusted by conspicuous resin (drying dark coloured) when initiated. Phyllodes not as above (the hairs less conspicuous and confined to between the longitudinal nerves). Branchlet ribs (at extremities of branchlets) often coated with an overburden of resin **A. effusifolia**

Acacia coolgardiensis Maiden, J. & Proc. Roy. Soc. New South Wales 53: 211, pl 15, figs 1–7 (1920). *Lecto* (fide Cowan & Maslin 1995: 18): Coolgardie, Western Australia, 26 August 1900, L.C. Webster (NSW); *isolecto*: K, PERTH 00745731. *Paralecto*: Coolgardie, Western Australia, 1899, L.C. Webster (NSW).

Acacia boorabbinensis Hochr., *Candollea* 2: 377 (1925). *Holo*: Boorabbin, Western Australia, 15 February 1905, B.P.G. Hochreutiner 2946 (G).

Multi-stemmed *shrubs* or *trees* 2–5(–7) m tall, stems with few to many, shallow to deep longitudinal flutings. *Bark* grey, smooth except finely longitudinally fissured at extreme base of stems on oldest plants. *Branchlets* silvery and minutely appressed-hairy between ribs, the ribs at ends of branchlets normally (but not always) with a thick, sometimes crenulated, overburden of resin. *New shoots* with a thick coating of resin when initiated, the branchlet and phyllode hairs becoming visible as the shoot expands, the expanding shoot sprinkled with reddish resin hairlets which are soon lost, viscid when fresh (not viscid when dry). *Phyllodes* terete, rarely sub-terete, (4–)6–11(–15) cm long, 0.6–0.8(–1) mm diam., filiform, erect, not rigid, sub-straight to shallowly incurved, grey-green or dull green, glabrous

or minutely appressed-hairy between the nerves; *longitudinal nerves* numerous, fine, close together, sometimes with overburden of resin; *apex* acute, straight to uncinat, innocuous to coarsely pungent. *Gland* situated on upper edge of phyllode 0–1 mm above pulvinus. *Inflorescences* simple, mostly paired within axils of phyllodes; *heads* showy, obloid to short-cylindrical, sometimes globular, 5–9(–12) × (4–)5–6 mm when dry, golden, normally superficially sessile with the very short peduncles obscured by the stamens at anthesis; *peduncles* 0.5–2(–3) mm long, stout (0.7–1 mm diam. when dry), normally moderately to densely ± appressed-hairy with sparse (rarely dense) red-brown resin hairlets intermixed with the orthodox hairs, indumentum often sparser or absent when in pod; *receptacles* with sparse to dense red resin hairlets which are absent when in pod. *Flowers* 5-merous; *sepals* free to 1/2-united. *Pods* terete, straight-edged or very slightly constricted between the seeds, (2–)4–8(–10) cm long, 1–2 mm wide, thinly coriaceous-crustaceous, straight to shallowly curved, glabrous or with minute, silvery, appressed hairs between the often obscure (not raised) longitudinal nerves, resinous (but not viscid), reddish brown. *Seeds* longitudinal in the pod, 2.5–4 mm long, 1–1.5 mm wide, obloid, shiny, normally tan; *aril* terminal and creamy white.

Characteristic features. Multi-stemmed *shrubs* or *trees* 2–5(–7) m tall, stems with few to many, shallow to deep longitudinal flutings. *Bark* smooth except finely longitudinally fissured at extreme base of stems on oldest plants. *Branchlets* hoary between ribs which normally have an overburden of resin. *New shoots* resin-encrusted, the expanding shoots sprinkled with reddish resin hairlets. *Phyllodes* terete, rarely sub-terete, (4–)6–11(–15) cm long, 0.6–0.8(–1) mm diam., filiform, not rigid, grey-green or dull green; *longitudinal nerves* numerous, fine, sometimes with overburden of resin; *apex* innocuous to coarsely pungent. *Inflorescences* mostly paired within axils of phyllodes; *heads* globular to obloid or short-cylindrical, 5–9(–12) × (4–)5–6 mm when dry, golden, normally appearing sessile with the very short peduncles obscured by the stamens at anthesis; *peduncles* 0.5–2(–3) mm long, stout, ± appressed-hairy with sparse (rarely dense) red-brown resin hairlets intermixed. *Flowers* 5-merous; *sepals* free to 1/2-united. *Pods* terete, 1–2 mm wide, thin-textured, ± obscurely longitudinally nerved. *Seeds* longitudinal in the pod; *aril* creamy white.

Selected specimens examined. WESTERN AUSTRALIA: Mullewa, 14 July 1971, *A.M. Ashby* 4252 (PERTH); 12 km E of Latham, 14 Aug. 1997, *F. Keast* L8C076 (PERTH); 3 miles [4.8 km] W of Bunjil on the road to Carnamah, 9 Aug. 1970, *B.R. Maslin* 739 (AD, BRI, K, PERTH); 4.5 miles [7.2 km] NW of Southern Cross towards Bullfinch, 12 Aug. 1971, *B.R. Maslin* 1954 (PERTH); 16 miles [25.7 km] SW of Kalgoorlie towards Coolgardie, 9 Aug. 1971, *B.R. Maslin* 1899 (HO, NY, PERTH); 51.5 miles [82.8 km] km S of Billabong Roadhouse on North West Coastal Highway [near southern boundary of Nerren Nerren Station], 16 June 1972, *B.R. Maslin* 2783 (BRI, PERTH); 23 km N of Murchison River on North West Coastal Highway, 21 Aug. 1973, *B.R. Maslin* 3338 (CANB, E, PERTH); near Modesty Downs Station, c. 21.5 km N of Holt Rock, 11 Oct. 1975, *B.R. Maslin* 3938 (PERTH); 45 km E of Mullewa towards Yalgoo, 31 Aug. 1976, *B.R. Maslin* 4263 (MEL, PERTH); 97.5 km NNE of Kalgoorlie on the road to Eudjulina Station, 18 Feb. 1981, *B.R. Maslin* 4849 (PERTH); 2.1 km E of Kununoppin on the road to Nungarin, 1 Dec. 1982, *B.R. Maslin* 5319 (PERTH); 3.5 km E of Mullewa on road to Yalgoo, 3 Apr. 1992, *B.R. Maslin* 7114 (PERTH); about 45 km NE of Kalannie, Black Road, 9.5 km N of Glamoff Road intersection, 4 Dec. 1996, *B.R. Maslin* 7514 (PERTH); 55.5 km E of Mullewa on the road to Yalgoo, 25 Jan. 2008, *B.R. Maslin* 9417 (PERTH); 18 km NE of Wubin on Great Northern Highway to Paynes Find, 12 Oct. 1999, *B.R. Maslin & J. Miller* 7887 (PERTH); Boorabbin, c. 88 km E of Southern Cross, 20 Aug. 1979, *K. Newbey* 5719 (PERTH); Talling Station [N of Pindar], 26 June 1993, *A. Payne* 3589 (NSW, PERTH); 7.9 km W of Broad Arrow on road to Ora Banda, Sep. 1979, *M.H. Simmons* 1176 (PERTH); base of Moorine Rock on Great Eastern Highway, Sep. 1979, *M.H. Simmons* 1238 (PERTH).

Distribution. Extends from near Nerren Nerren Station (c. 150 km north of Northampton) through the northern, north-eastern and north-central wheatbelt region (roughly Northampton to Mullewa, south to Koorda and east to Southern Cross) then east to the Coolgardie–Kalgoorlie region. It also occurs in the south-central wheatbelt near Holt Rock (c. 150 km south-east of Merredin) and extends to the south-west extremity of the arid zone in a few places, especially around Kalgoorlie. Cowan & Maslin (1995: 19, 20) and Cowan (2001: 329) refer to collections from Carey Downs, Byro and Curbur Stations: these are now provisionally referred to *A. incognita* (see below).

Habitat. In the agricultural zone *A. coolgardiensis* favours light, free-draining soils (light brown or yellow-brown, often gravelly, sandy loams) often in sandplain scrub and around granite rocks, whereas at the extremity of its range (e.g. the Kalgoorlie district) it occurs on heavier red-brown loam soils.

Flowering and fruiting period. Flowers from July to September, occasionally extending to early October. Peak flowering occurs in September while plants in July and August may be in bud or at anthesis. Pods with mature seeds occur from late October to January, occasionally persisting to February.

Conservation status. Not considered rare or endangered.

Etymology. The botanical name is based on the Western Australian goldfields township of Coolgardie which is located near the eastern extremity of the species' geographic range. The lectotype collection of the species was gathered from Coolgardie in 1900 by L.C. Webster (see Cowan & Maslin 1995: 19 for notes).

Common name. Sugar Brother.

Affinities. *Acacia coolgardiensis* is most closely related to *A. effusifolia* and is also related to *A. incognita* (see below under these species for discussion). The variant with fibrous bark referred to under *A. coolgardiensis* subsp. *coolgardiensis* by Cowan and Maslin (1995: 21) and represented by the specimen B.R. Maslin 4262 is *A. incognita*. The B.R. Maslin 4503 referred to in the same place is *A. coolgardiensis*.

Variation. *Acacia coolgardiensis* is typically characterised by its superficially sessile pair of heads within the axils of the phyllodes. These heads are in fact short-pedunculate (peduncles 0.5–2 mm long) but the peduncles are obscured by the stamens at anthesis. Occasionally, however, the peduncles are slightly longer (to 3 mm) and are visible below the stamens at anthesis. There is no taxonomic significance to this peduncle length variation.

***Acacia effusifolia* Maslin & Buscumb, stat. et nom. nov.**

Base name: *Acacia coolgardiensis* subsp. *effusa* R.S.Cowan & Maslin, *Nuytsia* 10: 21 (1995). (*Type*: 17.5 km SE of Mullewa towards Morawa, Western Australia, 22 August 1973, B.R. Maslin 3356 (*holo*: PERTH 00718580; *iso*: CANB, K).

Shrubs or *trees* 2–5 m tall, single-stemmed or more commonly dividing at ground level into 2–6 main stems; *stems* of mature plants with few to many, shallow to deep, longitudinal flutings (needs confirmation – see *Notes* below), seemingly not fluted on young plants. *Bark* grey, smooth except finely longitudinally fissured at extreme base of stems on oldest plants (needs confirmation – see *Notes* below). *Branchlets* silvery and minutely appressed-hairy between ± obscure ribs, the ribs at ends of

branchlets normally (but not always) with a thick, sometimes crenulated, overburden of resin. *New shoots* coated by resin when initiated, not viscid when dry, the expanding shoot sprinkled with red-brown resin hairlets which are soon lost. *Phyllodes* narrowly linear, narrowed at base, (4–)6–10(–14) cm long, (1–)1.5–3(–4) mm wide, sub-rigid, straight to shallowly incurved or shallowly recurved, sometimes resinous with a thin veneer of resin over entire surface (or occasionally confined to the nerves), variable in colour but commonly grey-green to sub-glaucous (ranging from green through grey-green to sub-glaucous or glaucous), with minute, appressed silvery hairs between the nerves, the oldest phyllodes sometimes glabrous; *longitudinal nerves* numerous and close together; *apex* acute, coarsely pungent to innocuous, straight to slightly curved, occasionally sub-uncinate. *Gland* situated on upper margin of phyllode 0–1 mm above pulvinus. *Inflorescences* simple, mostly paired within axils of phyllodes, appearing superficially sessile when peduncles are very short and obscured by the stamens at anthesis; *heads* showy, short-obloid to cylindrical, 5–15(–20) × 4–7 mm when dry; *peduncles* 1–6(–8) mm long, ± densely appressed-hairy (indumentum often obscured by resin) with sparse (sometimes dense) dark red-brown resin hairlets which persist to the fruiting phase; *receptacles* glabrous to sparsely hairy, occasionally intermixed with sparse red resin hairlets. *Flowers* 5-merous; *sepals* 1/2–2/3 length of petals, free or sometimes variably united for about 1/4 their length, narrowly oblong to spatulate; *petals* 1.5–2.2 mm long. *Pods* terete, straight-edged or more commonly very slightly constricted between the seeds, (2–)3–7(–9) cm long, 1–2 mm wide, thinly coriaceous-crustaceous to firmly chartaceous, straight to shallowly curved, glabrous or with minute, silvery appressed hairs between the often obscure (not raised) longitudinal nerves, resinous (but not viscid), brown to reddish brown. *Seeds* longitudinal in the pod, 3–4 mm long, c. 1 mm wide, obloid, shiny, brown; *aril* 1/3–1/2 as long as seed, terminal, fleshy, white.

Characteristic features. *Shrubs* or *trees* with presumably fluted stems and smooth bark. *Branchlets* hoary between ribs which normally have an overburden of resin. *New shoots* resin-encrusted, the expanding shoots sprinkled with reddish resin hairlets. *Phyllodes* narrowly linear, (4–)6–10(–14) cm long, (1–)1.5–3(–4) mm wide, sub-rigid, straight to shallowly curved, commonly grey-green to sub-glaucous, minutely silvery appressed-hairy between the numerous longitudinal nerves. *Inflorescences* mostly paired within axils of phyllodes, appearing sessile when peduncles very short; *heads* short-obloid to cylindrical, 5–15(–20) × 4–7 mm when dry; *peduncles* 1–6(–8) mm long, ± densely appressed hairy with sparse (sometimes dense) red-brown resin hairlets intermixed. *Flowers* 5-merous; *sepals* 1/2–2/3 length of petals, free or sometimes variably united for about 1/4 their length. *Pods* terete, 1–2 mm wide, thin-textured, ± obscurely longitudinally nerved. *Seeds* longitudinal in the pod; *aril* white.

Selected specimens examined. WESTERN AUSTRALIA: between Davyhurst and Goongarrie, 10 Sep. 1970, *J.S. Beard* 6259 (PERTH); Karara Station, 28 Oct. 1974, *J.S. Beard* 7196 (PERTH); Mt Farmer Station, 12 Aug. 1987, *P.J. Curry* 1047 (CANB, PERTH); Hill View Station, No. 1 Fence, 15 Aug. 1959, *S.J.J. Davies s.n.* (PERTH 06012795); 24 km ENE of Yuinmery Homestead, 18 Sep. 1986, *J. Dell* JD158 (PERTH); on Rabbit Proof Fence running E-W, S boundary of Running Water Paddock, Woolgorong Station, N of Mullewa, 25 May 2006, *D.J. Edinger* 5868 (PERTH); 45 km N of Cleary on road to Paynes Find, 9 Sep. 1987, *J.W. Green* 5235 (PERTH); 52.4 km from Wubin towards Mount Magnet, 28 July 1974, *B.R. Maslin* 3539 (CANB, PERTH – phyllodes narrower than normal); 96.5 km from Wubin towards Mount Magnet, 27 July 1974, *B.R. Maslin* 3548 (MEL, PERTH); 29 km W of Yalgoo towards Mullewa, 1 Aug. 1975, *B.R. Maslin* 3622 (BM, BRI, G, K, MEL, NSW, NY, PERTH); 22.5 km S of Billabong Roadhouse towards Geraldton [Northwest Coastal Highway, on Nerren Nerren Station], 8 Aug. 1974, *B.R. Maslin* 3718 (MEL, PERTH); 73.5 km S of Mount Magnet on Great Northern Highway to Wubin, 21 Aug. 1985, *B.R. Maslin* 4515 (PERTH); about 50 km due NE of Kalannie, W side of Lake Moore (Hudson's farm), 9 Sep. 1997, *B.R. Maslin* 7764 (PERTH); NW end of Jackson Range, W of Bullfinch – Menzies Road near Portman Mining

site, 30 Sep. 2004, *B.R. Maslin* 8608 (PERTH – phyllodes narrower than normal); 2 km due W of Windarling Range (between Bullfinch and Menzies), 30 Sep. 2004, *B.R. Maslin* 8612 (PERTH); 21.5 km N of Sandstone on road to Meekatharra, 4 Sep. 2006, *B.R. Maslin* 8958 (PERTH); 55.5 km E of Mullewa on the road to Yalgoo, 25 Jan. 2008, *B.R. Maslin* 9418 (PERTH); Gabyon Station [c. 40 km WNW of Yalgoo – phyllodes atypically short], 2 Nov. 1981, *A.A. Mitchell* 914 (CANB, K, PERTH); Wiluna area, Dec. 1970, *J. Morrissey* 40 (PERTH); 19 miles [30.6 km] S of Menzies, 13 Sep. 1966, *K.R. Newbey* 2580 (PERTH – phyllodes atypically narrow); near Bimbijy [Station, c. 60 km SE of Paynes Find – phyllodes atypically short], 15 Sep. 1990, *S. Pignatti* 483 (PERTH); Leinster outside town, 27 Aug. 1998, *J.G. & M.H. Simmons* 3719 (PERTH); 40 km NE of Nambi HS which is c. 65 km NNE of Leonora, 29 Aug. 1968, *P.G. Wilson* 7477 (PERTH).

Distribution. Occurs in the south-west extremity of the arid zone in Western Australia, in the rangeland pastoral station country. It is found in an area bounded by Nerren Nerren Station (c. 150 km north of Northampton) south-east through Mullewa to near Kalannie and Cleary, east through Meekatharra to Wiluna then south to near Lake Goongarrie (north of Kalgoorlie). A specimen (*D.J. Pearson* 1780) in bud from Queen Victoria Spring (about 250 km E of Goongarrie) has provisionally been referred to *A. effusifolia*, however, better material is needed to confirm this identification. Cowan & Maslin (1995: 19, 22) and Cowan (2001: 329, 330) refer to an outlier from Paraburdoo—this is now *A. thoma* Maslin, see Maslin & van Leeuwen (2008).

Habitat. *Acacia effusifolia* grows in a variety of habitats but is commonly recorded from red sand or sandy loam (sometimes over hardpan) in ‘Spinifex’ (*Triodia* spp.) communities, or heavier-textured red or brown loam or clay-loam soil in *Eucalyptus* woodland. It also grows on sandplains in yellow sand in shrubland communities.

Flowering and fruiting period. Flowers from July to September or very occasionally mid-June. Plants in June and July are often only in bud. Herbarium records also show the species as occasionally flowering in December or March (presumably in response to the intermittent summer rainfall). Pods with mature seeds have been collected mostly in October and November, occasionally December.

Conservation status. Not considered rare or endangered.

Etymology. The specific epithet is derived from the Latin *effusus* (spread out, expanded) and *folius* (leaf) and refers to the flat phyllodes which distinguish the species from its closest relative, *A. coolgardiensis*, which has terete phyllodes.

Common name. None known.

Affinities. *Acacia effusifolia* is most closely related to *A. coolgardiensis* and indeed the two taxa could just as well be treated as subspecies of a single variable species. However, as discussed in the *Introduction* above, we consider that it is best to regard them as species. *Acacia coolgardiensis* is most easily distinguished from *A. effusifolia* by its terete phyllodes that do not exceed 1 mm in width; in *A. effusifolia* the phyllodes are clearly flattened and are (1–)1.5–3 mm wide. The very few specimens that cannot confidently be assigned to *A. coolgardiensis* or *A. effusifolia* based on these phyllode characters mostly occur along the border between the wheatbelt region and the more inland pastoral zone, and also north of Kalgoorlie. Typical representatives of both species are found in these areas and the seemingly intermediate plants may possibly represent hybrids but further study is needed to determine if this is the case. Other characters that help distinguish *A. effusifolia* from *A. coolgardiensis*

are its often (but not always) longer spikes and peduncles; in *A. effusifolia* the peduncles are often clearly visible when the spikes are at anthesis, however, when the peduncles are very short (less than 3 mm long) they are obscured by the stamens and the spikes then appear to be sessile as normally occurs in *A. coolgardiensis*. *Acacia effusifolia* has a generally more inland distribution (in the rangeland pastoral country) than *A. coolgardiensis*, which is largely confined to the cropping zone of the wheatbelt. Their distributions overlap in the Mullewa–Yalgoo area where both are common, with *A. coolgardiensis* found on light-textured brown sandy loam soils and *A. effusifolia* on reddish, heavier textured loam-clay soils. These soil types occur in close proximity to one another. At 55.5 km east of Mullewa *A. coolgardiensis* (B.R. Maslin 9417) and *A. effusifolia* (B.R. Maslin 9418) are sympatric, together with *A. latior* (B.R. Maslin 9416). In this same general area there are a few specimens that may possibly represent hybrids between *A. effusifolia* and *A. latior*; also, the narrow-phyllode form of *A. latior* that occurs in the Blue Hill Range and elsewhere can be easily confused with *A. effusifolia* (see notes under *A. latior* below).

Acacia thoma is also related to *A. effusifolia*. In *A. thoma* the phyllodes are sometimes linear and care needs to be taken not to confuse these individuals with plants of *A. effusifolia* that have clearly pedunculate spikes. Linear-phyllode forms of *A. thoma* are most readily distinguished from *A. effusifolia* in the following ways (see Maslin & van Leeuwen 2008 further discussion): no red-brown resin hairlets on the peduncles and expanding new shoots, smaller flowers which are less densely arranged in the spikes, and a very small gamosepalous calyx which is less than half the length of the corolla.

There is a remarkable resemblance between *A. effusifolia* and *A. ramulosa* W.Fitzg. var. *ramulosa*, not only superficially in phyllode shape and size but also with respect to the spicate inflorescences and free sepals; the two taxa are sometimes sympatric. Fruiting specimens are easy to distinguish because the terete, striate pods of var. *ramulosa* are much wider (5 mm or more) than those of *A. effusifolia* (1–2 mm). Non-fruiting specimens can be distinguished because in var. *ramulosa* the phyllodes are more rigid and generally greener and straighter than those of *A. effusifolia*, and because its peduncles and new shoots lack the small, red-brown resin hairlets that occur on these organs in *A. effusifolia*.

Variation. The peduncles are very variable in length, ranging from 1 to 8 mm long. Cowan and Maslin (1995: 22) considered that there may be grounds for the recognition of discrete taxa based on peduncle length but this now appears unlikely. There are a few specimens with very narrow (yet flat) phyllodes 1 mm wide scattered throughout the range of the species (e.g. B.R. Maslin 3539 and 8608 and K.R. Newbey 2580). Specimens with atypically short phyllodes (about 4 cm long) have been collected from Bimbijy Station, 60 km SE of Paynes Find (S. Pignatti 483) and Gabyon Station, about 40 km WNW of Yalgoo (A.A. Mitchell 914).

Notes. There is little reliable information regarding the stem fluting or bark characteristics in this species. It seems probable, however, that like most other members of the *A. coolgardiensis* group (*A. incognita* excepted) the stems of mature plants of *A. effusifolia* are variably fluted and the bark is smooth except at the base of stems on oldest plants. Further data is needed to confirm these observations which are based on limited herbarium label information.

***Acacia incognita* Maslin & Buscumb, sp. nov.**

Fruticuli obconici vel arbores 3–5 m alti; *caulis principalis* aliquantum irregularis, non striatus. *Cortex* longitudinaliter fissurata. *Ramuli* glabri vel obscure appresse pilosi. *Surculi* novi glabri. *Phyllodia*

teretia vel plana, plerumque 7–12 cm longa, 1–1.2 mm lata, gracilia, non vel vix resinosa, glabra vel inconspicuo appresse pilosa, viridia vel interdum griseo-viridia, tenuiter longitudinaliter multi-striata, innocua vel grosse pungentia. *Inflorescentiae* simplices, 1 vel interdum 2 intra axillam phyllodiorum positae; *capitula* globularia vel breviter obloidea, 4–6 × 4–5 mm (in statu sicco); *pedunculi* plerumque 4–6 mm longi, graciles, glabri vel sub-glabri. *Flores* 5-meri; *sepala* lineari-spathulata, libera vel 1/4 connata. *Legumina* teretia, 3.5–10 mm longa, 1–2 mm lata, tenuiter coriacea-crustacea, ± obscure longitudinaliter nervata. *Semina* in legumine longitudinalia, anguste ellipsoidea vel interdum anguste obloidea, 3–5 mm longa, *c.* 1 mm lata; *arillus* albus vel eburneus.

Typus: Karara Station, approximately 1 km E of Mt Karara camp (Gindalbie Metals), 29° 09' 19.2" S, 116° 48' 27.6" E, 13 February 2008, *D. Coultas and C. Anderson* WT01 (*holo*: PERTH 07692358; *iso*: AD, CANB, K, MEL, NSW, NY).

Obconic *shrubs* or *trees* 3–5 m tall, dividing at or near ground level into many main stems, oldest plants often single-stemmed, young and adolescent plants with bushy, rounded crowns, the crowns (mature plants) to 5 m across and becoming sparse as plants age; main stems slightly crooked and not fluted. *Bark* grey, longitudinally fissured on stems and normally also the branches, exfoliating in short strips when old, smooth on young plants. *Branchlets* terete but often sub-angled or ± flattened at extremities, obscurely ribbed, the ribs not resin-encrusted but branchlet extremities often with a thin veneer of resin over entire surface, not viscid, glabrous or with somewhat obscure, appressed, silvery hairs between the ribs, pale yellow at extremities. *New shoots* light green, with a thick coating of resin when initiated but the resin forming a thin veneer as the shoots expand, not viscid, glabrous but often with scattered, microscopic, red-brown resin hairlets that are soon lost as shoots expand. *Phyllodes* commonly sub-terete to flat, sometimes terete, (4–)7–12 cm long, (0.8–)1–1.2(–1.5) mm wide, slender, not especially rigid, ascending to erect, straight to shallowly incurved, dull to very slightly shiny, not resinous or sometimes with a thin, obscure veneer of resin, not viscid, glabrous or with minute, obscure, appressed hairs mainly between the nerves, green or sometimes greyish green; *longitudinal nerves* numerous, fine, close together, of ± uniform prominence, very slightly raised (when dry); *apex* acute, terminated by a sub-straight to sub-uncinate, hard, brown, innocuous to coarsely pungent point; *pulvinus* 1.5–3 mm long, pale orange (often drying brownish) or sometimes yellow, ± obscurely transversely wrinkled. *Gland* inconspicuous, situated on upper margin of phyllode 0–1.5 mm above the pulvinus. *Inflorescences* simple, 1 or occasionally 2 within axils of phyllodes; *heads* usually globular to short-obloid, 4–6 × 4–5 mm (when dry), golden; *receptacles* usually 1–2 mm long, glabrous or sprinkled with short spreading hairs (no resin hairlets); *peduncles* usually (3–)4–6(–7) mm long, slender (0.3–0.4 mm diam. when in flower), glabrous or sometimes sparsely appressed-hairy, sometimes sprinkled with red or light brown resin hairlets, ± resinous, often dull yellow to tinged orange. *Bracteoles* linear-spathulate, 0.6–0.8 mm long, laminae sparsely ciliolate. *Flowers* 5-merous; *sepals* linear-spathulate, 0.6–1 mm long, free to 1/4 fused, 1/3–1/2 the length of petals; *petals* 1.3–1.5 mm long, glabrous. *Pods* terete, mostly very slightly constricted between seeds, 3.5–10 cm long, 1–2 mm wide, thinly coriaceous-crustaceous, straight to shallowly curved, dark red-brown, old pods sometimes scurfy, with a thin veneer of resin over entire surface, glabrous or sometimes (especially when young) with minute, silvery, appressed hairs between the nerves, ± obscurely longitudinally nerved, marginal nerve not thickened. *Seeds* longitudinal in pod, narrowly ellipsoid or sometimes narrowly obloid, 3–5 mm long, *c.* 1 mm wide, shiny, brown, peripheral nerve often darker-coloured; *pleurogram* very obscure; *areole* small (0.1–0.4 mm long), u-shaped with opening towards the hilum; *funicle* short and filiform, expanded into a fleshy, ± membranous, white to creamy white, terminal *aril* 1–3 mm long (up to *c.* 1/4 length of the seed).

Characteristic features. Obconic shrubs or trees 3–5 m tall, the main stems slightly crooked and not fluted. *Bark* longitudinally fissured on stems and normally also on the branches. *Branchlet* ribs without an overburden of resin but branchlet extremities often with a thin veneer of resin over entire surface, glabrous or obscurely appressed-hairy. *New shoots* glabrous. *Phyllodes* terete to flat, mostly 7–12 cm long and *c.* 1 mm wide, slender, not especially rigid, dull to very slightly shiny, not or scarcely resinous, glabrous or inconspicuously appressed-hairy, green or sometimes greyish green, finely longitudinally multi-striate; *apex* innocuous to coarsely pungent. *Inflorescences* simple, 1 or occasionally 2 within axils of phyllodes; *heads* globular to short-obloid, usually 4–6 × 4–5 mm (when dry); *peduncles* mostly 4–6 mm long, slender, glabrous or sub-glabrous. *Flowers* 5-merous; *sepals* free to 1/4 fused. *Pods* terete, mostly very slightly constricted between seeds, 3.5–10 cm long, 1–2 mm wide, thin-textured, ± obscurely longitudinally nerved. *Seeds* longitudinal in pod, 3–5 mm long, *c.* 1 mm wide; *aril* ± membranous, white to creamy white, up to *c.* 1/4 length of the seed.

Selected specimens examined. WESTERN AUSTRALIA: on Tenindewa Road North, 1 km N of Greenough River [about 40 km E of Mullewa], 23 June 1998, *P. Armstrong* S54A (PERTH); 36 miles [58 km] S of Yalgoo, 28 Oct. 1974, *J.S. Beard* 7189 (PERTH); Karara Station, *c.* 1 km W of Mount Karara, 3 Sep. 2007, *D. Coultas, F. Obbens & C. Anderson* AS-02 (AD, PERTH); S side of Mungada Road, Mount Karara Station, 29 Nov. 2006, *C. Godden & B. Taylor* DP5A-1 (PERTH); Karara Station, Gindalbie Iron Ore Project, 12 Sep. 2006, *C. Godden, D. Coultas & K. Rodda* GIND Opp 9 (PERTH); Barnong Station, *c.* 0.7 km S of Red Lake Well and 3.9 km SSW of Mugga Mugga Hill, *c.* 60.5 km SW of Yalgoo, 27 Sep. 2006, *A. Markey & S. Dillon* 5205 (PERTH); 29 km W of Yalgoo on the road to Mullewa, 1 Aug. 1975, *B.R. Maslin* 3625 (PERTH); 59 km W of Yalgoo towards Mullewa, 31 Aug. 1976, *B.R. Maslin* 4262 (PERTH); 48 km W of Yalgoo on the road to Mullewa, 3 Apr. 1992, *B.R. Maslin* 7110 (CANB, NSW, NY, PERTH) and *B.R. Maslin* 7112 (K, MEL, PERTH); about 80 km due E of Morawa, Blue Hill Range area, 7.8 km N of Gindalbie Mining Exploration Camp on road to Mungada Ridge, 19 July 2007, *B.R. Maslin* 9127 (PERTH); 46.5 km E of Mullewa on the road to Yalgoo, 25 Jan. 2008, *B.R. Maslin* 9412 (AD, CANB, K, MEL, NSW, NY, PERTH); Karara Station, about 3 km ENE of Gindalbie Metals mining camp entrance on road to Mungada Ridge, early Dec. 2007, *F. Rose s.n.* (PERTH 07692374).

Distribution. *Acacia incognita* is found from the vicinity of Mullewa and Yalgoo south to Karara Station (located about 80 km E of Morawa) and is often locally common. There are many collections from Blue Hill Range on Karara Station where it occurs in a number of populations, especially on the flats at the base of the ‘Karara Range’ (an informal name used for the discrete range that incorporates Mt Karara). *Acacia incognita* is also common about 110 km north of Karara Station where it occurs in a series of populations between about 20 to 30 km west of Yalgoo on the road to Mullewa. There are sporadic occurrences from west of Mullewa and in the region between Mullewa–Yalgoo. In the field *A. incognita* can easily be over-looked because it does not possess any particularly distinctive features and also because it superficially resembles the widespread and common species *A. coolgardiensis* (see below under *Affinities*). Therefore, further study is needed to define the geographic range of this species more precisely.

Habitat. *Acacia incognita* occurs in a semi-arid region at the western extremity of the Ereman Botanical Province near where it adjoins the species-rich South West Botanical Province. The area receives an annual rainfall of 250–300 mm with the highest falls occurring during the winter months of June and July; sporadic rainfall may also occur at other times of the year. It grows on red to red-brown loam or loamy clay (often with a stony or sandy surface) in Open Woodland or Mallee Woodland dominated by species of *Eucalyptus* (*E. ewartiana*, *E. kochii* subsp. *amaryssia* and *E. loxophleba* subsp. *supralaevis*) or shrubland dominated by *Melaleuca leiocarpa*. Associated *Acacia* species include *A. anthochaera*,

A. burkittii, *A. effusifolia*, *A. oblecta*, *A. ramulosa* var. *ramulosa* and *A. tetragonophylla*. It grows on either low rises or on flat plains. On Karara Station it is found on the lower slopes and adjacent flats surrounding low banded ironstone ranges.

Flowering and fruiting period. Extant collections show that plants of *A. incognita* flower in January, February, April, September and October. However, based on limited field knowledge and relatively few specimens, it appears that only a proportion of the biologically mature plants within the populations flower at any one time. It seems likely that this species flowers quickly and opportunistically in response to the timing of rainfall and to the amount of water reaching individual plants. Judging from the above phenology it appears that this species flowers following both summer and winter rains. Plants with mature seed have been collected in late October and early December, and some with very few seeds in July and August.

Conservation status. Not considered rare or endangered.

Etymology. The botanical name is derived from the Latin *incognitus* (unknown). It has been selected because the identity of this species has gone unrecognised until now on account of its superficial resemblance to *A. coolgardiensis*.

Common name. False Sugar Brother is suggested here as an appropriate common name.

Affinities. *Acacia incognita* is most closely related to the more widely distributed *A. coolgardiensis*. Indeed, in the past the two species were often confused because they have a similar growth form, long, slender, multi-striate phyllodes and often grow in close proximity to one another. Other significant characters shared by the two species include their resin-encrusted new shoots, free or partially united sepals, terete, narrow, thin-textured, obscurely striate pods and similar seeds. However, a careful examination of the plants enable the two species to be distinguished reliably. In the field *A. coolgardiensis* can be recognised by its smooth bark (except finely longitudinally fissured at extreme base of stems on oldest plants) and its stems which possess few to numerous, shallow to deep, longitudinal flutings. *Acacia incognita* on the other hand has longitudinally fissured bark on the main stems and this bark normally extends to the upper branches, furthermore, its stems are not fluted (although occasional depressions do occur on the stems where branches have abscised but these are not homologous with the distinctive longitudinal flutings that characterize *A. coolgardiensis* and other taxa in the '*A. coolgardiensis* group'). The two species grow close to one another (a few kilometres apart) on Karara Station and in the Mullewa–Yalgoo area; however, they seem not to co-occur, with *A. coolgardiensis* favouring more lighter-textured soils than those on which *A. incognita* occurs. On herbarium specimens the easiest way to distinguish the two species is that in *A. coolgardiensis* the heads are normally obloid to short-cylindrical (although sometimes they are globular), relatively large (mostly $5\text{--}9 \times 5\text{--}6$ mm at anthesis when dry), mostly paired within the axils of the phyllodes and importantly, normally appearing sessile because their stout peduncles (which are about twice as thick as those of *A. incognita*) are very short ($0.5\text{--}2\text{--}(3)$ mm long) and are normally obscured by the stamens at anthesis. In *A. incognita* the heads are usually globular to short-obloid, $4\text{--}6 \times 4\text{--}5$ mm (when dry), single or occasionally paired within axils of phyllodes, and on slender peduncles usually $(3\text{--})4\text{--}6\text{--}(7)$ mm long which are clearly visible when the heads are at anthesis. Other characters useful in recognizing *A. coolgardiensis* include its often resin-ribbed branchlets (ribs never with an overburden of resin in *A. incognita*) and its phyllodes which are never flat and which are commonly more grey in colour than those of *A. incognita*.

Notwithstanding the above differences between *A. incognita* and *A. coolgardiensis*, a closer examination of populations between Morawa and Yalgoo may be instructive in understanding the relationship between these two species better. Recent collections (of sterile material with terete phyllodes) in this area by the first author suggest the possibility of hybridity between *A. incognita* and *A. coolgardiensis* (see *B.R. Maslin* 9402, PERTH), but flowering material and probably genetic studies are needed to understand the taxonomic complexities better. A sterile specimen referred to *A. effusifolia* on account of its flat phyllodes was also collected from a different population in this same general area (see *B.R. Maslin* 9403, PERTH); in the field this plant had a similar facies to *B.R. Maslin* 9402 and it should also be included in any such study.

Acacia incognita is sometimes sympatric or parapatric with two other members of the '*A. coolgardiensis* group', *A. effusifolia* and *A. latior*, but is distinguished from both by its non-fluted stems, generally narrower, greener and often terete phyllodes and smaller heads on slender, glabrous or sparsely hairy peduncles.

Some specimens of *A. resinosa* are superficially very similar to those of *A. incognita* in having terete, finely multi-striate, green phyllodes, pedunculate heads and narrow pods. However, the two species are not especially closely related, with *A. resinosa* being most readily recognised by its gamosepalous calyx (sepals united for most of their length), resinous heads (making it difficult to tease-out individual flowers when heads are in bud) and flat, non-striate pods.

Variation. The phyllodes on plants from Karara Station vary from sub-terete to flat with often a few terete ones interspersed. This also applies to most plants in the Mullewa–Yalgoo populations but in this area it is possible to find plants with consistently terete phyllodes. For example, *B.R. Maslin* 7112 (48 km west of Yalgoo) has terete phyllodes and occurred in a population dominated by plants with compressed phyllodes (see *B.R. Maslin* 7110). The phyllodes are consistently terete on the four collections from the station country which are discussed below under *Variants*.

Variants. A few specimens (in mature and immature pod with some old flowers persisting) with terete phyllodes from the rangeland pastoral country about 200 km north of Mullewa, appear to be *A. incognita* except that they have longer than normal peduncles (5–12 mm) and receptacles (to 7 mm long). These plants have been collected from between Carey Downs and Callatharra stations (*J.S. Beard* 6848, PERTH), Byro Station (*J.S. Beard* 6855, PERTH), Curbur Station (*A.L. Payne* 111, PERTH) and Yalardy Station (*A.L. Payne* 268, PERTH). These specimens were referred to *A. coolgardiensis* subsp. *coolgardiensis* by Cowan and Maslin (1995: 20) and Cowan (2001: 329). Field studies and flowering material are needed to confirm the identity of these plants. Judging from the length of their fruiting receptacles the flowers will be arranged in distinctly obloid heads or short-cylindrical spikes which will be longer than those found on plants of typical *A. incognita* from more southerly locations (which have globular to short-obloid heads that measure 4–6 mm long when dry).

Another entity with terete phyllodes from the rangelands that has the general facies of *A. incognita* is represented by a few specimens in immature pod from a banded ironstone range on the eastern side of Lake Giles (near Johnson Soak), about 400 km south-east of Mullewa, namely, *A. Markey* & *S. Dillon* 5212, 5213 and 5214 (all PERTH). This entity differs most obviously from *A. incognita* in having, flat, broader pods (3–4 mm wide) and receptacles 3–5 mm long (suggesting that the flowers would be arranged in obloid heads or short-cylindrical spikes). Unlike the variant discussed above, the Lake Giles variant is not regarded as belonging to *A. incognita*, but it is not far removed from it. It appears to have close affinities with *A. balsamea* (Cowan & Maslin 1999: 417–418) but has less resinous branchlets and phyllodes than that species. Flowering and mature fruiting material and field studies are needed to assess the taxonomic status of the Lake Giles variant.

Acacia latior* (R.S.Cowan & Maslin) Maslin & Buscumb, *stat. nov.

Acacia coolgardiensis subsp. *latior* R.S.Cowan & Maslin, *Nuytsia* 10: 23 (1995). Type: 6.4 km E of Mullewa towards Yalgoo, Western Australia, 2 August 1974, B.R. Maslin 3629 (*holo*: PERTH 00343188; *iso*: BM, BRI, CANB, G, K, MEL, MO, NSW, NY, PERTH 00718505).

Rounded or obconic, multi-stemmed *shrubs* 1–3(–4) m tall, oldest plants occasionally single-stemmed, the main stems slightly crooked on mature plants, stems \pm sparingly and not conspicuously fluted with the flutings often present only towards base of thickest stems, crowns dense and compact with distinctive silvery tips when making new growth. *Bark* dark grey, smooth or finely longitudinally fissured. *New shoots* densely clothed with silvery white appressed hairs, the indumentum sometimes obscured by a reddish brown (when dry) resin when shoot is initiated but this growth phase very brief and not conspicuous, the resin disintegrating and persisting for a short time as scattered, irregularly-shaped, flattened, light brown plates of resin or as scattered reddish resin hairlets as the shoots expand to reveal the characteristic indumentum beneath. *Branchlets* slightly angular or sub-flattened and with minute, silvery, appressed hairs at the slender extremities (1–1.5 mm wide), often glabrous as branchlets mature, obscurely ribbed, the ribs not resinous. *Phyllodes* variable in shape and size, narrowly oblanceolate to linear-oblanceolate, linear-elliptic or linear, narrowed at base, (4–)5–11(–13) cm long, commonly 5–8(–10) mm wide but 2–4 mm wide in narrow-phyllode forms, sub-rigid, erect, straight to shallowly incurved, dull green to grey-green with a distinctive silvery sheen which is especially evident on young and adolescent phyllodes, appressed-hairy (the hairs on young and adolescent phyllodes normally covering entire lamina and often obscuring the nerves, but becoming confined to between the nerves, or sometimes absent, on oldest phyllodes); *longitudinal nerves* numerous, fine, very close together, normally the central nerve slightly more pronounced than the rest; *apex* acute or obtuse, terminated by a hard, innocuous or coarsely pungent, straight or sometimes slightly curved, brown point. *Gland* situated on upper margin of phyllode 0–2 mm above pulvinus. *Inflorescences* simple, normally paired within axils of phyllodes, occasionally 4 per axil; *heads* widely ellipsoid to obloid or short-cylindrical, 8–12 mm long, 5–7 mm wide when dry; *peduncles* 3–7 mm long, moderately to densely silvery appressed-hairy, occasionally with brown resin hairlets intermixed with the orthodox hairs. *Flowers* 5-merous; *calyx* c. 1/2 length of corolla, variably dissected to c. 1/2 its length into \pm oblong lobes, occasionally dissected to base; *petals* 1.5–2 mm long. *Pods* terete, not or shallowly constricted between the seeds, 2–5 cm long, (1.5–)2–3 mm wide, thinly to moderately coriaceous, straight to shallowly curved, reddish brown, appressed-hairy (hairs moderately dense), very obscurely longitudinally nerved (nerves not raised). *Seeds* longitudinal in the pod, 2–2.5(–3) mm long, 1.2–1.5 mm wide, obloid, shiny, light brown or dark brown; *aril* terminal, fleshy, white and sometimes almost as long as the seed.

Characteristic features. Rounded or obconic, normally multi-stemmed *shrubs*, main stems \pm sparingly fluted, crowns dense and compact. *New shoots* densely clothed with silvery white appressed hairs. *Branchlet ribs* obscure and not resinous. *Phyllodes* variable in shape and size, narrowly oblanceolate to linear-oblanceolate, linear-elliptic or linear, narrowed at base, commonly 5–8(–10) mm wide but 2–4 mm wide in narrow-phyllode forms, dull green to grey-green with a distinctive silvery sheen (due to indumentum) which is especially evident on young and adolescent phyllodes, appressed-hairy, with numerous, fine longitudinal nerves which are very close together. *Inflorescences* normally paired within axils of phyllodes; *heads* widely ellipsoid to obloid or short-cylindrical; *peduncles* 3–7 mm long, moderately to densely silvery appressed-hairy. *Flowers* 5-merous; *calyx* variably dissected to c. 1/2 its length into oblong lobes, occasionally dissected to base. *Pods* terete, not or shallowly constricted between the seeds, (1.5–)2–3 mm wide, thin-textured, very obscurely longitudinally nerved. *Seeds* small (2–2.5 mm or occasionally 3 mm long).

Selected specimens examined. WESTERN AUSTRALIA: 4 miles [6.4 km] N of Mullewa, 20 Aug. 1965, *J.S. Beard* 4321 (PERTH); White Wells Station, 40 miles [64 km] E of Perenjori, 5 Nov. 1974, *J.S. Beard* 7367 (PERTH – narrow-phyllode form); between Cue and Mount Magnet, 12 July 1931, *W.E. Blackall* 81 (PERTH); Pindar, 16 Sep. 1931, *W.E. Blackall* 668 (PERTH); near exploration camp, Gindalbie mining lease, Karara Station, 5 Feb. 2007, *D. Coultas s.n.* (PERTH 07534736 – narrow-phyllode form); Karara Station, Mount Karara, 23 May 2007, *D. Coultas & C. Anderson s.n.* (PERTH 07464401 – narrow-phyllode form); Blue Hill Range, Windaning Hill, Karara Station c. 6.5 km NNE of Mulga Bore and 77 km W of Paynes Find, 17 Sep. 2005, *A. Markey & S. Dillon* 3312 (PERTH – narrow-phyllode form); Blue Hill Range, Karara Station, c. 6.5 km ENE of Mungada Well and 4 km ENE of Jasper Hill, c. 77 km W of Paynes Find, 22 Sep. 2005, *A. Markey & S. Dillon* 3313 (PERTH – narrow-phyllode form); 60 km W of Yalgoo towards Mullewa, 1 Aug. 1974, *B.R. Maslin* 3626 (PERTH – narrow-phyllode form); Gnows Nest Range, 50 km SE of Yalgoo towards Paynes Find, 31 Aug. 1976, *B.R. Maslin* 4256 (PERTH – narrow-phyllode form); 6.5 km E of Mullewa on the road to Yalgoo, 17 Dec. 1981, *B.R. Maslin* 5076 (PERTH); Karara Station, between Perenjori and Paynes Find, Mount Karara, 27 June 2006, *B.R. Maslin* 8787 (K, MEL, PERTH – narrow-phyllode form); c. 100 km due E of Morawa, on Perenjori – Warriedar road, 93 km from turn-off 2 km S of Perenjori, 10 Apr. 2007, *B.R. Maslin* 9113 (CANB, PERTH – narrow-phyllode form); 55.5 km E of Mullewa on the road to Yalgoo, 25 Jan. 2008, *B.R. Maslin* 9416 (PERTH); East Yuna Reserve, c. 70 km NE of Geraldton, 33 km WNW of Mullewa, 12–16 Oct. 1976, *B.G. Muir* 51(2.6) (PERTH).

Distribution. Common in the vicinity of Mullewa in the northern wheatbelt region of south-west Western Australia where it extends to about 10 km north, 30 km south and 50 km east of the township; is also grows in the East Yuna Reserve about 30 km west-north-west of Mullewa. There are scattered occurrences to the east of Mullewa (to about 60 km west of Yalgoo), the Gnows Nest Range about 50 km south of Yalgoo, on White Wells Station (about 150 km south of Yalgoo) and especially in the Blue Hill Range and adjacent areas on Karara and Warriedar pastoral stations (now conservation reserves), about 130 km south of Mullewa. A specimen labelled as having been collected from ‘between Cue and Mount Magnet’ (*W.E. Blackall* 81) is the most easterly known occurrence of the species. This locality is about 100 km east of Yalgoo and located well inside the arid zone; confirming that this locality is correct will be difficult because of the vague locality data provided by the collector. *Acacia lator* often forms dense stands in the places where it grows.

Habitat. Around Mullewa *A. lator* grows in gently undulating country most commonly in shrubland on yellow or pale brown, often gravelly, sand or sandy loam. In the Blue Hill Range area and in some areas to the east of Mullewa, it is found on heavier, red-brown, loam clay loam soils in open *Eucalyptus* woodland. The narrow-phyllode form of *A. lator* found in the Blue Hill Range (see below under *Variation*) is common on mid to upper slopes of Banded Ironstone formations in open woodland and shrubland with *Melaleuca leiocarpa*, *Eucalyptus leptopoda* and *Acacia* species (e.g. *A. aneura*, *A. quadrimarginea*, *A. sibina* and *A. ramulosa* (Markey & Dillon, in review)).

Flowering and fruiting period. Flowers from June to August or sometimes September. Pods with mature seeds have been collected in November and December.

Conservation status. Not considered rare or endangered.

Etymology. The botanical name is derived from the Latin *latus* (broad) and was created by Cowan and Maslin (1995: 22–23) because broad phyllodes effectively distinguished the taxon from the other two subspecies of *A. coolgardiensis*. At that time, however, it was not known that atypically narrow-phyllode forms of the taxon were common in the Blue Hill Range area, nor was *A. sulcaticaulis*.

known. However, even though broad phyllodes are not diagnostic for the taxon within the context of the '*A. coolgardiensis* group' the epithet is retained because it has been in use for over a decade.

Common name. Broad-leaf Sugar Brother is suggested as a common name for this new species.

Affinities. *Acacia latior* is parapatric and/or sympatric with *A. coolgardiensis*, *A. effusifolia* and *A. incognita* in the Mullewa area and is most readily recognised by its broad, flat phyllodes, conspicuously silvery white-hairy new shoots and non-resinous branchlet ribs. In the field *A. latior* is seen to have a lower stature (plants not above 3–4 m tall) and a denser, more compact crown than its relatives. There are a few specimens collected from between Mullewa and Yalgoo that, judging from morphological criteria, may possibly represent hybrids between *A. effusifolia* and *A. latior* (namely, *J.S. Beard* 7163, *R.J. Cumming* 1952 and *B.R. Maslin* 4261, 7111 & 7803, all PERTH). *Acacia latior* is also related to *A. sulcaticaulis* from Mt Mulgine (see under that species below for discussion).

The narrow-phyllode form of *A. latior* (see above) which is common in the Blue Hill Range and adjacent areas on Karara Station is sometimes sympatric with plants provisionally identified as *A. effusifolia*. The latter species is seemingly uncommon in this area and most of the few specimens seen are sterile (except one that possessed a few seeds). These two entities closely resemble one another superficially but *A. latior* is recognised most reliably by its conspicuous, densely hairy new shoots with the indumentum persisting to the adolescent and often mature phyllodes (hairs often obscuring the nerves) which have a distinctive silvery sheen. Although the new shoots of *A. effusifolia* are hairy the indumentum is much less conspicuous and the hairs are confined to between the phyllode nerves. Also, the seeds of *A. effusifolia* are slightly longer (3–4 mm) than those of *A. latior* (2.5–3 mm). *Acacia ramulosa*, var. *ramulosa*, which is relatively common in the Karara area, is often sympatric with *A. latior* and/or *A. effusifolia* and can be confused with these species on account of having narrowly linear, finely multi-striate phyllodes and pedunculate, spicate inflorescences. Fruiting specimens of var. *ramulosa* are easy to recognise because the terete pods are strongly striate-nerved and 5 mm or more wide. Sterile or flowering specimens can be problematic but var. *ramulosa* can generally be recognised by its more rigid and generally greener and straighter phyllodes. Also, the peduncles of this variety lack the red resin hairlets that occur on *A. effusifolia* and sometimes *A. latior*, and its new shoots are not conspicuously hairy, nor are its adolescent and mature phyllodes silvery as in *A. latior*. Notwithstanding these differences, it is often difficult to name plants in the Blue Hill Range area confidently.

Variation. *Acacia latior* is very variable in its phyllode shape and size. Around Mullewa the species is readily recognised (and distinguished from all other members of the '*A. coolgardiensis* group') by its oblanceolate phyllodes which are normally about 5–8 cm long and 5–8 mm wide. However, in the Blue Hill Range area, 130 km south of Mullewa, the phyllodes are generally linear (but narrowed at their base), long (often 7–11 cm) and narrow (2–4 mm wide). Notwithstanding these phyllode differences the Blue Hill Range populations are clearly referable to *A. latior* on the basis of the following characters: plants 2–3(–4) m tall with a dense crown, branchlet ribs obscure and not resinous, new shoots with a conspicuous, silvery white, dense indumentum, phyllodes with numerous, very fine, narrow longitudinal nerves that are very close together and apical points that are normally straight (occasionally shallowly curved), peduncles 2–6 mm long with a moderate to dense indumentum (rarely with reddish resin hairlets intermixed with the orthodox hairs) and seeds relatively small. Plants with narrow phyllodes have also been collected from between Mullewa and Yalgoo (e.g. *B.R. Maslin* 3626), from south of Yalgoo towards the Blue Hill Range, e.g. Gnows Nest Range (*B.R. Maslin* 4256) and Mount Warriedar (*B.R. Maslin* 9113), and from White Wells Station about 50 km south-east of Blue Hill Range (*J.S. Beard* 7367). While these narrow-phyllode forms may possibly represent a discrete

entity (an infraspecific taxon of *A. latior*), an examination of the above-mentioned collections and field studies throughout much of the geographic range of *A. latior* suggest that there is clinal variation in phyllode width, with the narrowest forms found in the Blue Hill Range area. Further study is warranted to better-elucidate the nature of phyllode variation within this species better; such studies may benefit from an examination of the relationship between phyllode width and soil type (pale coloured sand-loam vs reddish brown clay-loam) on which the plants occur. As discussed under *Affinities* above, the narrow-phyllode forms of *A. latior* are superficially very similar to *A. effusifolia*.

Acacia sulcaticaulis* Maslin & Buscumb, *sp. nov.

Fruticuli (raro arbores) multi-caules, obconici vel anguste obconici; *caules* longitudinaliter striati. *Ramuli* ad extremitates applanati. *Surculi* novi leviter resinosi, \pm glabri. *Phyllodia* anguste elliptica, (4–)5–10(–14) cm longi, 5–10 mm lati, tenuiter multi-striata, nervis numerosis, confertis parallelis, spatio internervis glabris vel microscopicaliter appresso-pilosis. *Inflorescentiae* simplices; *capitula* obloidea; *pedunculi* brevi (3–7 mm), glabri vel sparse appresso-pilosi, \pm resinosi. *Flores* 5-meri; *sepala* spatulata, libera vel partialiter connata. *Legumina* teretis, non vel tantum leviter inter semina constricta, parva (20–35 \times 1.4–1.8 mm), tenuiter crustacea vel tenuiter coriacea, \pm recta, rubro-brunnea, \pm glabra. *Semina* areola minima.

Typus: east of Morawa, Western Australia [precise locality withheld for conservation reasons], 4 September 2007, D. Coultas & C. Anderson AS-04 (*holo*: PERTH 07577478; *iso*: CANB, K, MEL).

Multi-stemmed, obconic or narrowly obconic *shrubs* (1–)2–4 m tall, rarely *trees* to 6 m tall, phyllodes concentrated towards ends of branches (crowns occupy about 1/5 of total plant height), stems and main branches obviously longitudinally fluted. *Bark* dark grey, smooth. *Branchlets* clearly flattened and 1.5–2.5 mm wide at extremities, ageing terete, obscurely ribbed, sometimes lightly resinous (but not viscid), the resin forming a very thin veneer over surface, glabrous or with microscopic, silvery, straight, appressed hairs that are commonly confined to immediately below insertion of phyllodes, yellow-green to pale orange-brown at extremities, aging dull reddish then grey. *New shoots* lightly resinous and viscid (but not sticky when dry), glabrous or with microscopic, appressed, straight, white hairs between the phyllode nerves when initiated. *Phyllodes* mostly narrowly elliptic, (4–)5–10(–14) cm long, 5–10 mm wide, coriaceous, mostly straight but some slightly curved, dull green, not resinous or slightly resinous, glabrous or with microscopic, appressed, straight, white hairs between the nerves (hairs very difficult to see); *longitudinal nerves* numerous, close together, fine and of uniform prominence or the central one slightly more pronounced than the rest, slightly raised (when dry); *marginal nerve* discrete but not prominent, yellow; *apex* acute, not pungent. *Glands* situated on upper margin of phyllode 0–2 mm above the pulvinus, obscure. *Inflorescences* simple, one or two within axils of phyllodes; *heads* obloid, 8–12 \times 6–8 mm when dry, golden; *peduncles* 3–7 mm (shortest peduncles \pm obscured by stamens with the heads then superficially appearing sessile), glabrous to very sparsely appressed-hairy, \pm resinous. *Bracteoles* similar to sepals, sub-peltate, 1.2–1.5 mm long; *claws* narrowly oblong to linear; *laminae* \pm ovate, *c.* 0.5 mm wide, thickened abaxially and dark brown. *Flowers* 5-merous; *sepals* 3/5–3/4 length of petals, spatulate, 1.2–1.4 mm long, free to base or fused for *c.* 1/4 (rarely 1/2) their length, sparsely hairy, claws narrowly linear, laminae brown; *petals* 2.2–2.5 mm long, glabrous. *Pods* terete, not or very slightly constricted between the seeds, 20–35 mm long, 1.4–1.8 mm wide, thinly crustaceous to thinly coriaceous, straight or almost so (the valves shallowly recurved following dehiscence), red-brown, glabrous or sub-glabrous (sprinkled with microscopic, straight, closely appressed hairs which are difficult to see). *Seeds* longitudinal in the pod, obloid, 2–2.5 mm long, 0.9–1.2 mm wide, turgid, with a satin lustre, mid-brown but sometimes dull yellowish near the

centre, peripheral nerve dark-coloured; *areole* u- to v-shaped, extremely small (0.1–0.2 mm long,) open towards the hilum; *funicle* expanded into a fleshy, white *aril*.

Characteristic features. Multi-stemmed obconic to narrowly obconic *shrubs* (rarely *trees*) with longitudinally fluted, smooth stems. *Branchlets* flattened at extremities. *New shoots* lightly resinous, \pm glabrous. *Phyllodes* narrowly elliptic, finely multi-striate with numerous, close, parallel nerves, glabrous or microscopically appressed-hairy between the nerves. *Heads* obloid; *peduncles* 3–7 mm long, glabrous to very sparsely appressed-hairy, \pm resinous. *Flowers* 5-merous; *sepals* spatulate, free or fused for *c.* 1/4 (rarely 1/2) their length. *Pods* terete, not or very slightly constricted between the seeds, small ($20\text{--}35 \times 1.4\text{--}1.8$ mm wide), thinly crustaceous to thinly coriaceous, \pm straight, red-brown, \pm glabrous. *Seeds* with extremely small *areole*.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld] 24 Apr. 2007, *D. Coultas & K. Greenacre* VM-06 (PERTH); 18 May 2007, *D. Coultas & C. Anderson* DCCA-05 (PERTH); 29 Oct. 2007, *D. Coultas & C. Anderson s.n.* (PERTH 07577508); 11 Dec. 2007, *D. Coultas & C. Anderson* 14 (PERTH); 17 July 2007, *B.R. Maslin* 9124 (AD, NSW, PERTH); 2 Oct. 2007, *B.R. Maslin et al.* BRM 9129 (PERTH).

Distribution. *Acacia sulcaticaulis* is known from the vicinity of Mt Mulgine in the Midwest region of Western Australia about 90 km east of Morawa. It is locally abundant. The general area in which the new species occurs is relatively poorly collected, therefore it is possible that other populations will be found in the future. However, as can be seen below the Mt Mulgine populations are seemingly habitat-specific to areas of quartz substrate and if this proves correct it may constrain the places where *A. sulcaticaulis* will grow.

Habitat. The new species occurs in a semi-arid area with an annual rainfall of 250–300 mm, most of which falls between late autumn and early winter (May to July). It typically grows in dense shrubland with *Acacia burkittii* and *Allocasuarina acutivalvis* on skeletal, red silty loam, on steep slopes, ridges and along the rocky creek courses. Although the Mt Mulgine area has a complex geology *A. sulcaticaulis* seems to favour areas where quartz predominates in the soil.

Flowering and fruiting period. Because of the paucity of collections it is difficult to determine the flowering and fruiting period for this new species accurately; furthermore, it is likely that, as with many other arid zone species of *Acacia*, this one responds opportunistically to rainfall. Based on the material to hand (all collected in 2007) plants were at full anthesis in early September and pods with mature seeds occurred in early to mid-December. It is possible that *A. sulcaticaulis* has a relatively short flowering period of perhaps only about one month. It is estimated that in 2007 flowering probably commenced around the middle of August, however, because the onset of flowering is possibly dependent upon the timing and intensity of autumn/winter rainfall, the flowering period (and also the fruiting period) may vary slightly from year to year.

Conservation status. *Acacia sulcaticaulis* is recently listed as Priority One under DEC Conservation Codes for Western Australian Flora.

Etymology The botanical name is derived from the Latin *sulcus* (furrow, groove) and *caulis* (stem) in reference to the characteristic fluting (with furrows between the raised flutes) found on stems and branches.

Common name. Mt Mulgine Fluted Wattle

Affinities. *Acacia sulcatacaulis* has many characters that justify its inclusion in the '*A. coolgardiensis* group', most particularly its fluted stems, finely multi-striate phyllodes, obloid heads, free or partially fused sepals, terete, thin-textured and obscurely nerved pods. The new species is, however, readily distinguished from all other members of this group by its clearly flattened branchlet apices; other characters that help characterise this geographically restricted species include its broad, glabrous (or indistinctly appressed hairy), green phyllodes, its short-pedunculate heads and its small pods.

Acacia sulcatacaulis is most closely related to *A. latior* on account of its non resin-ribbed branchlets, broad phyllodes and pedunculate heads but *A. latior* is distinguished in the following ways:

- Phyllodes generally broadest above the middle, silvery grey-green and invested with a layer of short, closely-appressed, glistening hairs (the hairs dense on young and adolescent phyllodes and tend to cover the entire surface of the lamina, on oldest phyllodes the hairs are normally confined to between the nerves: observe at $\times 10$ magnification). In *A. sulcatacaulis* the phyllodes are broadest near the middle, they are bright green in colour and are either glabrous or possess microscopic hairs between the nerves (the hairs are normally sparser and much more difficult to see than those of *A. latior*). Also, the phyllodes of *A. latior* tend to be more obviously tapered towards the base and commonly slightly narrower than those of *A. sulcatacaulis*.
- Expanding new shoots densely and obviously hairy (glabrous or indistinctly hairy *A. sulcatacaulis*).
- Branchlet apices slender (1–1.5 mm wide) and \pm angular or sub-flattened (1.5–2.5 mm wide and clearly flattened in *A. sulcatacaulis*). Also, in *A. latior* the branchlet apices are more obviously appressed-hairy than those of *A. sulcatacaulis*.
- Peduncles moderately to densely appressed-hairy (glabrous or sparsely appressed-hairy in *A. sulcatacaulis*).
- Pods slightly wider (2–3 mm) and with a more obvious indumentum (hairs moderately dense). In *A. sulcatacaulis* the pods are less than 2 mm wide and glabrous or almost so.

The phyllode nerves, and sometimes the phyllode shape and size of *A. sulcatacaulis* are similar to those of the more southerly distributed *A. warramaba* Maslin (1982: 108). However, the two species are not closely related, with *A. warramaba* most readily distinguished by its non-fluted stems, \pm uncinatate phyllodes, racemose inflorescences, globular heads which are smaller (3.5–4 mm diam.) and flat pods which are 6–8 mm wide. The general field facies of *A. sulcatacaulis* is reminiscent of *A. kempeana* F.Muell. but the two species are not closely related, *A. kempeana* being readily recognised by its non-fluted stems, gamosepalous calyx and papery pods which are 1 cm or more wide.

Variation. *Acacia sulcatacaulis* is normally a narrowly obconic shrub 2–4 m tall, but the shape and height of the plants can vary depending on the habitat. On favourable sites (i.e. deep soil along watercourses at the base of Mt Mulgine) plants may attain a height of about 6 m, whereas on exposed sites in skeletal soil around granite outcrops towards the summit of Mt Mulgine they are often low shrubs 1–1.5 m tall with wide-spreading crowns. This range of variation is seen in many other *Acacia* species and is not considered unusual.

Discovery. This species has only recently been discovered. It was first collected by David Coultas and Kylie Greenacre in April 2007 while undertaking botanical surveys in the Mt Mulgine area.

Acknowledgements

We wish to thank Gindalbie Metals Ltd for their generous financial and other support of this study. We also thank the staff of Woodman Environmental Consulting (namely David Coultas, Cathy Godden and Frank Obbens) for providing specimens and information concerning the plants growing on Gindalbie lease areas on Karara Station and Fred Rose (Gindalbie Metals Ltd) for providing a seed collection of *A. incognita* from the Blue Hill Range area. Paul Wilson is thanked for providing the Latin descriptions.

References

- Cowan, R.S. (2001). *Acacia coolgardiensis*. In: Orchard, A.E. & Wilson, A.J.G. (eds) *Flora of Australia*. Vol. 11A, pp. 328–330. (ABRS/CSIRO Publishing: Melbourne.)
- Cowan, R.S. and Maslin, B.R. (1995) *Acacia* miscellany 10. New taxa and notes on previously described taxa of *Acacia*, mostly section *Juliflorae* (Leguminosae: Mimosoideae), in Western Australia. *Nuytsia* 10(1): 15–62.
- Cowan, R. S. & B. R. Maslin (1999). *Acacia* miscellany 17. Miscellaneous new taxa and lectotypifications in Western Australian *Acacia*, mostly section *Plurinerves* (Leguminosae: Mimosoideae). *Nuytsia* 12(3): 413–452.
- Markey, A.S. & Dillon, S. (in review). Flora and vegetation of the Banded Ironstone Formations of the Yilgarn Craton: the Central Tallering Land System. *Conservation Science Western Australia*.
- Maslin, B. R. (1982). Studies in the genus *Acacia* (Leguminosae: Mimosoideae). 12. Two new species from the eastern goldfields, Western Australia. *Nuytsia* 4(1): 105–112.
- Maslin, B.R. & van Leeuwen, S. (2008). New taxa of *Acacia* (Leguminosae: Mimosoideae) and notes on other species from the Pilbara and adjacent desert regions of Western Australia. *Nuytsia*: 18: 139–188.